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Growth promoting effect of *Pimpinella anisum* (Aniseed) in broiler chickens

[Efecto promotor del crecimiento de *Pimpinella anisum* (semilla de anís) en pollos broiler.]

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Abstract: The present study was conducted to evaluate growth promoting effect of *Pimpinella anisum* L. (aniseed) in broiler chickens in terms of body weight gain, organ weights, feed intake and feed conversion ratio (FCR). For this purpose, four levels (0.5, 1.0, 1.5 and 2.0 grams per kg feed) of aniseed powder were administered in feed from day 0 till the end of experiment (42 days of age). The body weight gain, feed intake and FCR were recorded on weekly basis. The birds showed good performance (better weight gain, better feed intake and FCR) when aniseed was fed in lower doses however, birds showed poor performance at higher levels of aniseed. Likewise, almost same pattern was observed for organ weights. This study suggests the good effect of aniseed on performance of broiler chickens at lower doses which suggests the further need of series experiments to find out the minimum safe levels of aniseed to be incorporated in broiler ration to get desirable results.

Keywords: *Pimpinella anisum* L., aniseed, broiler chickens, growth promoting, feed conversion ratio.

Resumen: Se realizó el presente estudio para evaluar el efecto promotor del crecimiento de *Pimpinella anisum* L. (anís) en pollos de engorde en términos de ganancia de peso corporal, peso de los órganos, el consumo de alimento y conversión alimenticia (FCR). Para este propósito, cuatro niveles (0,5, 1,0, 1,5 y 2,0 gramos por kg de alimento) de anís en polvo se administraron en el pienso desde el día 0 hasta el final del experimento (42 días de edad). La ganancia de peso corporal, consumo de alimento y FCR fueron registrados en forma semanal. Las aves mostraron un buen rendimiento (mejor ganancia de peso, un mejor consumo de alimento y FCR) cuando el anís se alimentó en dosis más bajas, sin embargo, las aves mostraron malos resultados en los niveles más altos de anís. Del mismo modo, se observó casi el mismo patrón de peso de los órganos. Este estudio sugiere que el buen efecto del anís en el rendimiento de pollos de engorde en dosis más bajas que sugiere la necesidad adicional de experimentos de la serie para conocer los niveles de seguridad mínimos de anís que se incorporarán en la ración de pollos de engorde para obtener los resultados deseados.

Palabras Clave: *Pimpinella anisum* L., anís, pollos de engorde, promotores del crecimiento, conversión alimenticia

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INTRODUCTION

Various plant extracts and herbs are being used as ethno medicines throughout the world. They play an important role in maintaining human health, improving the quality of human life and maintain animal performance (Osman *et al.*, 2005). Plants, herbs and their extracts are considered to be as natural and safe by the users (Masood *et al.*, 2013).

Aniseed (*Pimpinella anisum* L.), is an aromatic plant mostly found in Iran, India, Turkey, Pakistan and many other countries. Aniseed essential oil contains as active ingredient anethole, methylchavicol, eugenol, anisaldehyde and estragole. Aniseed, are used to enhance the function of digestive system and it can be administered for deworming purposes (Cabuk *et al.*, 2003), antimicrobial (Osman *et al.*, 2005), antifungal (Soliman and Badea, 2002) and antipyretic (Afifi *et al.*, 1994).

Resultantly, the aromatic plants, herbs and their essential oils have become more important due to their multiple functions including antioxidants, antiplatelet, antitumor and immune-stimulating properties (Valero and Salmeron, 2003; Raziq *et al.*, 2012; Mushtaq *et al.*, 2012). In Pakistan, the use of aniseed is very common in human food to improve the digestion, as a dewormer and in ruminants to treat the ailments of indigestion and parasite associated problems.

Poultry sector is one of the most vibrant segments of agriculture sector in Pakistan (Awais and Akhtar, 2012; Eila *et al.*, 2012; Javaid *et al.*, 2012). It generates direct or indirect employment for both male and female community of the rural areas (Islam *et al.*, 2012).

Because in Pakistan, most of the poultry farming is conventional based and the resource poor small scale poultry farmers mostly depend on the herbal products to handle the health and production related problems because this is hard for them to access the urban areas and afford expensive allopathic growth promoters. Keeping in view the uses of aniseed the present study was designed to evaluate the growth promoting effect of aniseed in broiler chickens.

MATERIALS AND METHODS

Plant material

The seeds of *Pimpinella anisum* (L.) were purchased from the local herbal market and identified for their authentication by a botanist in department of Botany,

University of Agriculture, Faisalabad-Pakistan and powdered using an electric grinder.

Experimental chicks, feed and management

A total of 300, one-day-old, Hubbard broiler chicks (Hubbard Al-Noor Chicks, Pvt-Pakistan) were purchased from local hatchery unit. Chicks were reared on floor pens under standard management practices. All pens had concrete floors with new wood-shavings litter. All the chicks were kept on broiler starter ration up to 2 weeks of age and then fed a broiler finisher. These commercial-type starter and finisher diets (Table N° 1) and water were given *ad libitum*. Heating was supplied by electric heat bulbs and temperature was maintained between 29.5 - 32.5° C during the first week of age and was reduced by 3° C on weekly basis. Artificial lighting and ventilation were provided continuously throughout the experimental period.

Table N° 1
Composition and calculated nutrient contents of starter and finisher diets

Ingredients	Starter	Finisher
Corn	48.00	50.00
Rice	10.00	12.00
Rice polishing	3.00	3.00
Soybean meal	15.00	12.00
Canola meal	15.00	12.00
Fish meal	3.00	3.00
Corn gluten meal 60%	2.00	3.00
Molasses	3.00	4.00
DCP	1.00	1.00
Premix	0.68	0.68
DL-methionine	0.12	0.12
L-lysine	0.20	0.20
Total	100.00	100
Calculated Analysis		
Metabolizable energy (Kcal/Kg)	2900	3000
Crude protein %	20	18
Crude fibre %	4.9	4.5
Ether extract %	3.01	4.0
Calcium%	1.02	0.80
Available phosphorus%	0.65	0.40
Lysine	1.1	1.1
Methionine	0.5	0.5

All the chicks were vaccinated with the Lasota strain against Newcastle disease by the eye drop method on 5th day of age and when they were 28 days old, Lasota strain vaccine against Newcastle disease was added to the drinking water. Gumboro vaccine, against infectious bursal disease, was administered through eye drops on 14th day of age. Oil emulsion vaccine, against hydropericardium syndrome, was injected at a dose rate of 0.25 ml subcutaneously on 18th day of age.

Study design

The chicks (n = 300) were divided into five groups and placed 20 per pen with three pens (replicates) per treatment. Treatments were randomized within blocks. Treatments were as follows:

Aniseed @ 0.5 g/kg feed supplemented group (Group A); Aniseed @ 1.0 g/kg feed supplemented group (Group B); Aniseed @ 1.5 g/kg feed supplemented group (Group C); Aniseed @ 2.0 g/kg feed supplemented group (Group D) and non supplemented control group (Group E). Different concentrations of aniseed were supplemented in feed from 7th to 42nd days of age. The trial was pursued for 42 days.

Evaluation of growth promoting effect

Five chicks from each pen were weighed on day of feed supplementation with aniseed (7th day/1st week of age) and then reweighed on 14th day/2nd week, 21st

day/3rd week, 28th day/4th week and 35th day/5th week and 42nd day/6th week of age. The weight of aniseed supplemented chicks was compared with control groups. Weight on day 7 was therefore considered as the initial weight.

Feed consumption was also evaluated on daily basis and then converted to weekly basis. Feed conversion ratio (FCR) was calculated as the grams of feed consumed to produce one gram of live weight. FCR was also determined from 1st to 6th week of age (7th to 42nd days of age).

At the 14th, 24th, 34th and 42nd day of the experiment, five birds from each group were slaughtered randomly and data on different organ weights (kidney, liver, heart, kidney, spleen and thymus) were recorded.

Statistical analysis

Data were analyzed by randomized complete block design two factorial analysis of variance. Mean were further compared by "LSD" test at alpha 0.01.

RESULTS AND DISCUSSION

Physical Parameters

Daily feed intake, feed conversion ratio and body weight gain of the birds of various groups have been presented (Tables N° 2, N° 3 & N° 4). The body weights (Table N° 2) of all the groups given aniseed started increasing from 4th week as compared to control.

Table N° 2
Weight gain (g) of broiler chicks supplemented with aniseed

Group	Treat-ment	Body Weight					
		1st Week	2nd Week	3rd Week	4 th Week	5 th Week	6 th Week
A	0.5g/kg	58.11 ± 2.94 ^j	71.63 ± 2.14 ⁱ	376.00 ± 23.30 ^b	891.00 ± 54.46 ^f	1386.00 ± 66.12 ^c	2032.20 ± 78.23 ^a
B	1g/kg	61.55 ± 1.66 ^j	70.01 ± 1.21 ⁱ	347.00 ± 32.11 ^h	865.00 ± 41.13 ^f	1246.00 ± 48.84 ^{cd}	1967.80 ± 72.41 ^a
C	1.5g/kg	65.15 ± 2.32 ^j	68.07 ± 3.02 ^j	350.00 ± 38.96 ^h	943.00 ± 53.54 ^e	1320.00 ± 85.43 ^c	1883.30 ± 91.26 ^{ab}
D	2g/kg	65.54 ± 2.41 ^j	64.01 ± 2.19 ^j	260.00 ± 29.25 ^h	744.00 ± 37.57 ^g	1101.00 ± 48.80 ^c	1748.90 ± 54.09 ^b
E	Control	61.78 ± 1.30 ^j	62.73 ± 1.61 ^j	242.00 ± 27.07 ^h	724.00 ± 56.71 ^g	1144.00 ± 71.96 ^d	1738.90 ± 69.70 ^b

Mean ± SE within the column showing the same superscript differ non-significantly from each other

Table N° 3
Feed intake (g) of broiler chicks supplemented with aniseed

Group	Treat-ment	Feed Intake					
		1st Week	2nd Week	3rd Week	4 th Week	5 th Week	6 th Week
A	0.5g/kg	19.45 ± 2.72 ^g	45.29 ± 1.61 ^f	66.85 ± 3.56 ^e	118.91 ± 4.81 ^d	146.39 ± 11.77 ^c	170.94 ± 9.30 ^{ab}
B	1g/kg	19.37 ± 2.11 ^g	42.31 ± 3.48 ^f	72.88 ± 3.25 ^e	113.71 ± 5.66 ^d	136.44 ± 7.22 ^c	164.61 ± 11.75 ^b
C	1.5g/kg	19.06 ± 2.88 ^g	46.11 ± 3.52 ^f	76.06 ± 2.56 ^e	120.69 ± 5.26 ^d	141.95 ± 10.18 ^c	178.13 ± 7.22 ^a
D	2g/kg	21.40 ± 1.76 ^g	46.38 ± 3.40 ^f	76.86 ± 3.99 ^e	121.66 ± 6.49 ^d	147.23 ± 11.23 ^c	180.64 ± 8.9 ^a
E	Control	19.73 ± 3.35 ^g	41.41 ± 4.13 ^f	65.63 ± 3.17 ^e	114.13 ± 8.18 ^d	137.62 ± 12.42 ^c	168.89 ± 9.69 ^{ab}

Mean ± SE within the column showing the same superscript differ non-significantly from each other

Table N° 4
Feed conversion ratio (g/g) of broiler chicks supplemented with aniseed

Group	Treat-ment	Feed Conversion					
		1st Week	2nd Week	3rd Week	4 th Week	5 th Week	6 th Week
A	0.5g/kg	1.49 ± 0.03 ^g	1.65 ± 0.05 ^f	1.80 ± 0.04 ^e	1.89 ± 0.02 ^d	2.00 ± 0.01 ^c	2.06 ± 0.03 ^c
B	1g/kg	1.50 ± 0.08 ^g	1.55 ± 0.03 ^g	1.75 ± 0.08 ^e	1.83 ± 0.03 ^{de}	1.94 ± 0.1 ^d	2.13 ± 0.05 ^{bc}
C	1.5g/kg	1.43 ± 0.07 ^h	1.52 ± 0.06 ^g	1.71 ± 0.05 ^e	1.93 ± 0.03 ^d	2.01 ± 0.02 ^c	2.16 ± 0.05 ^b
D	2g/kg	1.44 ± 0.07 ^h	1.64 ± 0.04 ^f	1.73 ± 0.07 ^e	1.92 ± 0.01 ^d	2.06 ± 0.03 ^c	2.31 ± 0.04 ^{ab}
E	Control	1.41 ± 0.02 ^h	1.49 ± 0.03 ^g	1.74 ± 0.04 ^e	1.95 ± 0.06 ^d	2.15 ± 0.3 ^b	2.45 ± 0.05 ^a

Mean ± SE within the column showing the same superscript differ non-significantly from each other

During the present study, the body weights of all groups given aniseed at 1st, 2nd and 3rd weeks were found to be non-significantly different from each other. However, the body weight was increased in various groups given aniseed (Table N° 2). Likewise, in another study (Al-Kassie, 2008), the supplementation of 1% aniseed in broiler diets significantly improved the performance of birds on the basis of weight gain and FCR during a growing period of 6 week. Authors concluded that aniseed growth promoting effect might be due to digestive stimulating effect and antimicrobial effect. Similar findings have been reported by Mehmet *et al.* (2005) and El-Deek *et al.* (2001) who investigated that the higher body weight was found in birds fed with aniseed. The increase in body weight may be due to the presence of active material such as anethole, which has stimulating effects on the digestive system as reported previously (Tucker, 2002; Cabuk *et al.*, 2003; Giannenas *et al.*, 2003). The feed intake (Table N° 3) in all groups administered with aniseed during 1st, 2nd, 3rd and 4th weeks was non-significantly

different from control. But feed intake during 5th and 6th week was increased non-significantly in groups B, C and D. The findings of our study are also inline to the investigations of Proudfoot *et al.* (1990); Jamroz and Kamel (2002) and Ramakrishna *et al.* (2003) who reported the non significant differences in feed intake of supplemented and non supplemented groups with aniseed. The results of present study are in contrast to the findings of Guo *et al.* (2004) who found increase in feed intake of the aniseed supplemented groups.

In this trial, at day 42nd the carcass weight of groups A, B, C and D was significantly higher than rest of all the groups. These investigations are different to the findings of El-Deek *et al.*, (2001), Hernandez *et al.* (2004) and Sarica *et al.* (2005) but are similar to that of Ather (2000) and Botsoglou *et al.* (2002).

Effect on various organs

The effect of aniseed on weight of various organs is mentioned in Table N° 5. On 14th and 24th day the absolute weight of the kidney (Table 5A), liver (Table

Nº 5B), heart (Table Nº 5C), spleen (Table Nº 5D), and thymus (Table Nº 5E) and was non-significantly different in all groups. But it increased on day 34th in groups A, B and C and in the group D it increased on

day 24th. Absolute weight of heart was also higher in groups A, B and C as compared to the negative control group.

Table Nº 5
Kidney (A), Liver (B), Heart (C), Spleen (D) and Thymus weight (E) (g) of broiler chicks treated with aniseed.

Table 5A

Treated Groups	Kidney			
	1 st	2 nd	3 rd	4 th
A	0.54 ± 0.03 ^g	2.95 ± 0.07 ^f	10.79 ± 1.13 ^{bc}	13.70 ± 0.65 ^a
B	0.55 ± 0.03 ^g	2.95 ± 0.13 ^f	7.60 ± 0.31 ^{de}	11.95 ± 0.86 ^{ab}
C	0.59 ± 0.03 ^g	2.32 ± 0.10 ^{fg}	7.45 ± 0.80 ^{de}	8.45 ± 0.62 ^d
D	0.67 ± 0.08 ^g	2.64 ± 0.23 ^{fg}	6.01 ± 0.34 ^e	7.19 ± 0.73 ^{de}
E	0.67 ± 0.08 ^g	2.823 ± 0.39 ^f	6.23 ± 0.65 ^e	8.89 ± 0.59 ^{cd}

Mean ± SE within the column showing the same superscript differ non-significantly from each other.

Table Nº 5B

Treated Groups	Liver			
	1 st	2 nd	3 rd	4 th
A	2.81 ± 0.08 ^f	15.01 ± 0.60 ^e	39.00 ± 3.15 ^{bc}	45.60 ± 0.66 ^a
B	3.06 ± 0.12 ^f	16.03 ± 0.80 ^e	31.36 ± 2.04 ^d	44.09 ± 2.06 ^{ab}
C	2.14 ± 0.08 ^f	11.98 ± 0.72 ^e	33.04 ± 1.10 ^{cd}	34.88 ± 2.46 ^{cd}
D	2.20 ± 0.09 ^f	10.99 ± 0.89 ^e	31.03 ± 3.14 ^d	34.54 ± 1.20 ^{cd}
E	2.20 ± 0.09 ^f	10.04 ± 0.37 ^e	31.16 ± 3.16 ^d	38.01 ± 1.29 ^c

Mean ± SE within the column showing the same superscript differ non-significantly from each other.

Table Nº 5C

Treated Groups	Heart			
	1 st	2 nd	3 rd	4 th
A	0.60 ± 0.04 ^f	2.65 ± 0.11 ^e	8.63 ± 0.68 ^{bc}	9.99 ± 0.47 ^{ab}
B	0.60 ± 0.04 ^f	2.75 ± 0.03 ^e	7.54 ± 0.35 ^{cd}	10.64 ± 1.05 ^a
C	0.56 ± 0.03 ^f	2.54 ± 0.06 ^e	7.64 ± 0.53 ^{cd}	9.78 ± 0.47 ^{ab}
D	0.62 ± 0.03 ^f	2.24 ± 0.12 ^f	6.28 ± 0.64 ^d	7.28 ± 0.29 ^{cd}
E	0.62 ± 0.03 ^f	1.94 ± 0.08 ^{ef}	7.51 ± 1.02 ^{cd}	10.14 ± 0.80 ^{ab}

Mean ± SE within the column showing the same superscript differ non-significantly from each other.

Table Nº 5D

Treated Groups	Spleen			
	1 st	2 nd	3 rd	4 th
A	0.12 ± 0.02 ^{jk}	1.10 ± 0.07 ^{lg}	1.67 ± 0.17 ^d	3.75 ± 0.16 ^a
B	0.15 ± 0.01 ^{ij}	1.04 ± 0.03 ^{gh}	1.38 ± 0.21 ^f	2.65 ± 0.37 ^b
C	0.08 ± 0.01 ^k	0.78 ± 0.05 ^h	1.83 ± 0.24 ^{cd}	2.65 ± 0.17 ^b
D	0.08 ± 0.01 ^k	0.72 ± 0.08 ^{hi}	1.18 ± 0.08 ^h	2.28 ± 0.08 ^{bc}
E	0.09 ± 0.01 ^k	0.69 ± 0.06 ^{ij}	2.37 ± 0.14 ^{bc}	2.12 ± 0.28 ^{cd}

Mean ± SE within the column showing the same superscript differ non-significantly from each other.

Table N° 5E

Treated Groups	Thymus			
	1 st	2 nd	3 rd	4 th
A	0.20 ± 0.03 ^g	1.64 ± 0.18 ^f	5.93 ± 0.35 ^c	11.10 ± 0.52 ^a
B	0.23 ± 0.01 ^{fg}	1.22 ± 0.05 ^{fg}	6.11 ± 1.00 ^c	9.40 ± 0.27 ^b
C	0.15 ± 0.02 ^g	0.89 ± 0.03 ^{fg}	5.63 ± 0.70 ^{cd}	8.85 ± 0.63 ^b
D	0.09 ± 0.01 ^g	1.03 ± 0.13 ^{fg}	3.77 ± 0.21 ^e	4.42 ± 0.22 ^{de}
E	0.09 ± 0.01 ^g	1.14 ± 0.18 ^{fg}	5.82 ± 0.35 ^{cd}	9.09 ± 0.43 ^b

Mean ± SE within the column showing the same superscript differ non-significantly from each other.

Weight of kidney increased at day 34th in groups A, B, C and D. Similar findings have been reported by Simsek *et al.* (2007) and Soltan *et al.* (2008) and our finding in contrast to the results of Cabuk *et al.* (2006). At 42nd day, the weight of spleen showed a significant increase in group A. Our results disagree to that of Simsek *et al.* (2007) and Hernandez *et al.* (2004), who reported that feeding of aniseed extract to the broiler chickens, had no effect on weight of spleen. However our results are similar to that of Zou *et al.* (2006) who determined that addition of plant extracts had significant positive effect on spleen weight. The weight of thymus (Table 5E) on 42nd day of the study period was significantly higher in group A. Our findings are in consonance with the results of Zou *et al.* (2006).

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